National Institute of Environmental Health Sciences

Weather conditions and visits to the medical wing of emergency rooms in a metropolitan area during the warm season in Israel: A predictive model

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Abstract:

Global climate changes affect health and present new challenges to healthcare systems. The aim of the present study was to analyze the pattern of visits to the medical wing of emergency rooms (ERs) in public hospitals during warm seasons, and to develop a predictive model that will forecast the number of visits to ERs 2 days ahead. Data on daily visits to the ERs of the four largest medical centers in the Tel-Aviv metropolitan area during the warm months of the year (April-October, 2001-2004), the corresponding daily meteorological data, daily electrical power consumption (a surrogate marker for air-conditioning), air-pollution parameters, and calendar information were obtained and used in the analyses. The predictive model employed a time series analysis with transitional Poisson regression. The concise multivariable model was highly accurate (r (2) Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.819). The contribution of mean daily temperature was small but significant: an increase of 1 degrees C in ambient temperature was associated with a 1.47% increase in the number of ER visits ($P < 0.001$). An increase in electrical power consumption significantly attenuated the effect of weather conditions on ER visits by 4% per 1,000 MWh ($P < 0.001$). Higher daily mean SO(2) concentrations were associated with a greater number of ER visits (1% per 1 ppb increment; P Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.017). Calendar data were the main predictors of ER visits (r (2) Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.794). The predictive model was highly accurate in forecasting the number of visits to ERs 2 days ahead. The marginal effect of temperature on the number of ER visits can be attributed to behavioral adaptations, including the use of air-conditioning.

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Resource Description

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Temperature

Air Pollution: Ozone, Particulate Matter, Other Air Pollution

Air Pollution (other): SO2; CO; NO

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Urban

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Israel

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Morbidity/Mortality

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content